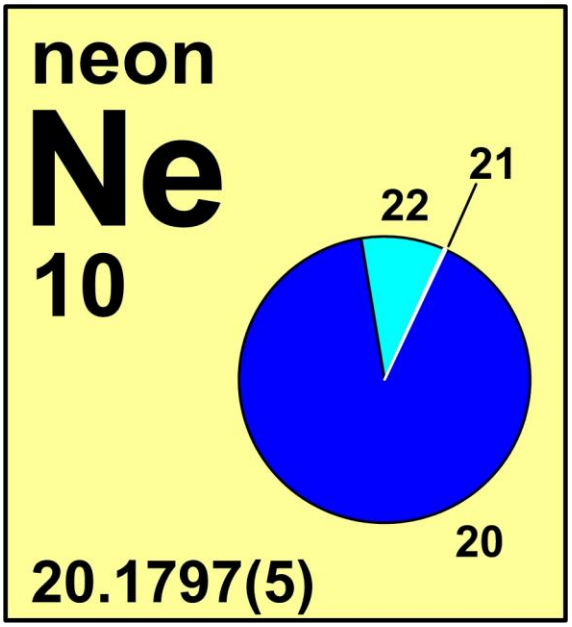
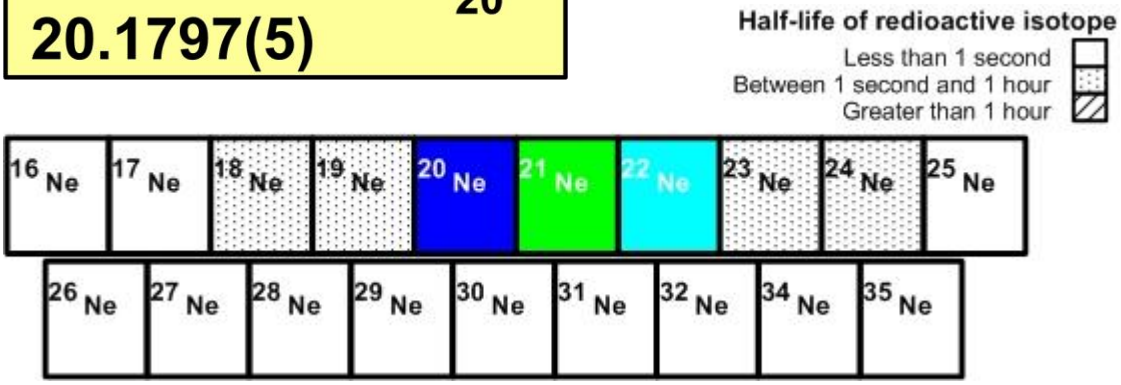
neon



Stable isotope	Atomic mass*	Mole fraction
^{20}Ne	19.992 440 18	0.9048
^{21}Ne	20.993 846 68	0.0027
^{22}Ne	21.991 385 11	0.0925

* Atomic mass given in unified atomic mass units, u.



Important applications of stable and/or radioactive isotopes

Isotopes in geochronology and earth processes

1) ^{21}Ne and ^{22}Ne have nucleogenic components that form in the Earth's crust largely by reactions of ^{18}O and ^{19}F in minerals with neutrons and alpha particles emitted from U and Th decay. In addition, Ne isotopes can form at the surface of the Earth and extraterrestrial bodies by cosmic-ray induced spallation reactions on Mg, Si, Al, and Na. Analyses of all 3 stable Ne isotopes may be used to distinguish these sources from primordial Ne. The relative amounts of atmospheric Ne and crustal nucleogenic Ne isotopes in deep groundwaters and natural gases can be used in studies of solid-water-gas interactions and migration. The cosmogenic component is mainly detected in ^{21}Ne and can be used to determine cosmic-ray exposure ages of rock samples, including meteorites exposed during travel through space and boulders exposed by melting of glacial ice.

Figure 1: Glacial erratic boulder in Washington state, US. Cosmogenic ^{21}Ne dating can be used to determine time since such blocks were uncovered by ice.

2) Ne is subject to stable isotope fractionation by physical processes such as exchange between gas, liquid, and solid phases. Small variations in the ^{22}Ne/^{20}Ne ratio have been used to examine gas-liquid exchange processes during groundwater recharge and discharge.

Isotopes in industry and medicine

1) ^{22}Ne is used for production of the radioisotope ^{22}Na.
2) ^{20}Ne can be used for production of the radioisotope ^{18}F, although ^{18}O is used more commonly for this purpose.
3) ^{21}Ne has been used in Masers to study quantum physics.